

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings of claims in the application. Applicants have submitted a new complete claim set showing any marked up claims with insertions indicated by underlining and deletions indicated by strikeouts and/or double bracketing.

Listing of Claims:

1. (Currently Amended) In a distributed computing environment, a computer-implemented method for dynamically implementing a workflow responsive to a directory object state changes of objects in a directory, the directory comprising a network-based directory service providing storage and lookup of objects corresponding to resources, the workflow comprising stored information defining a plurality of tasks and flow between the tasks, the method comprising:

~~Automatically~~ automatically detecting a state change to an object in ~~a the~~ the directory, ~~the directory corresponding to a directory schema, the directory schema defining a hierarchy of content classes, wherein at least one content class of the hierarchy includes a flexible attribute;~~ and

responsive to detecting the state change, automatically:

mapping the state change to the object ~~to a~~ to the workflow ~~comprising a set of tasks;~~ and

executing ~~the tasks to achieve a desired state in the directory~~ one of the tasks of the workflow.

2. (Currently Amended) The method of claim 1, wherein executing the ~~tasks~~ task further

Type of Response: Amendment

Application Number: 09/995,004

Attorney Docket Number: MS1-772US/154742.01

Filing Date: November 26, 2001

comprises storing a change in state of the workflow corresponding to the one of the tasks ~~the desired state~~.

3. (Currently Amended) The method of claim 1, wherein executing the ~~tasks~~task further comprises ~~continuously~~ executing an operation of a task of the plurality of tasks until convergence of ~~the~~a desired state is identified.

4. (Currently Amended) The method of claim 1, wherein executing the ~~tasks~~task further comprises storing a sequence of operations based on the tasks.

5. (Currently Amended) The method of claim 1, wherein executing the ~~tasks~~task further comprises storing information corresponding to one or more directory objects to which the workflow applies.

6. (Currently Amended) The method of claim 1, wherein executing the ~~tasks~~task further comprises storing status information based on respective status of at least one ~~subset of the tasks~~other task of the workflow.

7. (Currently Amended) The method of claim 1, wherein mapping the state change to the object to the workflow further comprises evaluating the state change to the object based on a declarative condition stored as a text string on an object instance of a content class defined by ~~the~~a directory-schema.

8. (Currently Amended) The method of claim 1, wherein ~~a task~~one of the tasks comprises

Type of Response: Amendment

Application Number: 09/995,004

Attorney Docket Number: MS1-772US/154742.01

Filing Date: November 26, 2001

any combination of a declarative condition or an operation that is stored as a text string ~~on~~in an object corresponding to the one of the tasks ~~instance of a content class defined by the~~ directory schema.

9. (Previously Presented) The method of claim 1, wherein semantics of the workflow are based on a workflow schema.

10. (Currently Amended) The method of claim 1, wherein semantics of the mapping of the state change to the object to the workflow, ~~semantics of the mapping~~ are based on an event association object schema.

11. (Currently Amended) The method of claim 1, wherein ~~executing the tasks~~ at least ~~one~~ subset some of the tasks are executed with respect to one another based on an order of execution relationship comprising a finish-start relationship, a parallel execution relationship, a precedence constraint relationship, or a task priority relationship.

12. (Currently Amended) The method of claim 1, wherein ~~executing the tasks~~ at least ~~one~~ subset some of the tasks ~~is~~ are executed with respect to one another based on a precedence constraint relationship or a task priority relationship.

13. (Currently Amended) The method of claim 1, wherein the method further comprises:
monitoring a status corresponding to a task of the tasks;
storing the status on a status monitoring object; and
wherein a content class in ~~the~~ a directory schema defines the status-monitoring object.

Type of Response: Amendment

Application Number: 09/995,004

Attorney Docket Number: MS1-772US/154742.01

Filing Date: November 26, 2001

14. (Currently Amended) The method of claim 1, wherein the method further comprises:
monitoring a set of directory resources affected by the workflow;
storing the directory resources on a status monitoring object; and
wherein a content class in ~~the~~ a directory schema defines the status-monitoring object.

15. (Currently Amended) The method of claim 1, wherein the method further comprises:
monitoring a status corresponding to an operation of the workflow;
determining that the status comprises a failure status; and
responsive to the determining, taking a corrective action to advance the workflow in
view of the failure status; ~~and~~
~~wherein a content class in the directory schema defines the status-monitoring object.~~

16. (Currently Amended) The method of claim 1, wherein executing the ~~tasks~~ task further
comprises:
updating a status corresponding to ~~a~~ the task in the workflow; and
~~responsive to the updating,~~ evaluating the workflow to determine that a next task of the
tasks needs to be implemented.

17. (Cancelled)

18. (Currently Amended) The method of claim 1, wherein the tasks implement a policy with
respect to one or more directory resources, and wherein mapping the state change to the object
to the workflow further comprises automatically determining the workflow based on the policy.

Type of Response: Amendment
Application Number: 09/995,004
Attorney Docket Number: MS1-772US/154742.01
Filing Date: November 26, 2001

19. (Currently Amended) A ~~One or more~~ computer-readable medium comprising computer-executable instructions to implement a plurality of workflows responsive to ~~a state changes to directory objects in the directory state change, the directory comprising a network-based directory service allowing devices on a network to store, modify, and lookup objects corresponding to resources, the workflows comprising stored information defining respective pluralities of tasks and flow therebetween,~~ the computer-executable instructions comprising instructions for performing a process, the process comprising:

detecting a state change to an object in ~~a the~~ directory, ~~wherein at least one object of the directory is defined by a flexible attribute configured to store a plurality of different data types, the functionality of the at least one object varying in accordance with the data type stored on the at least one object; and~~

responsive to detecting the state change:

~~mapping identifying, among the plurality of workflows, one of the workflows to which the state change to the object correspondsto a workflow comprising a set of tasks; and~~

executing ~~the one or more tasks of the identified workflowto achieve a desired state in the directory.~~

20. (Currently Amended) The computer-readable medium of claim 19, wherein the ~~instructions for executing the tasks task further comprises instructions for storing the desired statea state of the workflow as changed by execution of the task.~~

21. (Currently Amended) The computer-readable medium of claim 19, wherein the ~~instructions for executing the tasks task further comprises instructions for continuously~~

Type of Response: Amendment

Application Number: 09/995,004

Attorney Docket Number: MS1-772US/154742.01

Filing Date: November 26, 2001

executing an operation of a task of the tasks until convergence of the a desired state is identified.

22. (Currently Amended) The computer-readable medium of claim 19, wherein the ~~instructions for executing the tasks-task~~ further comprises instructions for storing a sequence of operations based on the plurality tasks.

23. (Currently Amended) The computer-readable medium of claim 19, wherein ~~instructions for executing the tasks-task~~ further comprises instructions for storing information corresponding to one or more directory-objects in the directory to which the workflow applies.

24. (Currently Amended) The computer-readable medium of claim 19, wherein the ~~instructions for executing the tasks-task~~ further comprises instructions for storing status information based on respective status of at least one subset of the tasks.

25. (Currently Amended) The computer-readable medium of claim 19, wherein the ~~instructions for mapping the state change to the object-identifying the workflow~~ further comprises instructions for evaluating the state change to the object based on content of the object-a declarative condition stored as a text string on an object instance of a content class defined by the directory schema.

26. (Currently Amended) The computer-readable medium of claim 19, wherein a task of the tasks comprises any combination of declarative conditions and operations that are stored as a text string on an one of the objects instance of a content class defined by the directory schema.

Type of Response: Amendment

Application Number: 09/995,004

Attorney Docket Number: MS1-772US/154742.01

Filing Date: November 26, 2001

27. (Currently Amended) The computer-readable medium of claim 19, wherein semantics of the workflow are based on a workflow schema.

28. (Currently Amended) The computer-readable medium of claim 19, wherein the ~~instructions for mapping identifying the workflow the state change to the object, semantics of the mapping are~~ is based on an event association object schema.

29. (Currently Amended) The computer-readable medium of claim 19, wherein ~~the instructions for executing the tasks,~~ at least ~~one subset~~ some of the tasks are executed with respect to one another based on an order of execution relationship comprising a finish-start relationship, a parallel execution relationship, a precedence constraint relationship, or a task priority relationship.

30. (Currently Amended) The computer-readable medium of claim 19, wherein ~~the instructions for executing the tasks,~~ at least ~~one subset~~ some of the tasks are executed with respect to one another based on a precedence constraint relationship or a task priority relationship.

31. (Currently Amended) The computer-readable medium of claim 19, wherein the computer-executable instructions further comprise instructions for:

automatically:

monitoring a status corresponding to a task of the tasks; and
storing the status on a status monitoring object; ~~and~~

Type of Response: Amendment

Application Number: 09/995,004

Attorney Docket Number: MS1-772US/154742.01

Filing Date: November 26, 2001

~~wherein a content class in the directory schema defines the status monitoring object.~~

32. (Currently Amended) The computer-readable medium of claim 19, wherein the computer-executable instructions further comprise instructions for:

automatically:

monitoring a set of directory resources affected by the workflow; and

storing indicia of the directory resources ~~on in~~ a status monitoring object; ~~and~~

~~wherein a content class in the directory schema defines the status monitoring object.~~

33. (Currently Amended) The computer-readable medium of claim 19, wherein the computer-executable instructions further comprises instructions for automated operations ~~en~~comprising:

monitoring, by a status-monitoring object ~~defined by a content class in the directory schema~~, a status corresponding to an operation of the workflow;

determining that the status comprises a failure status;

responsive to the determining, taking a corrective action to advance the workflow in view of the failure status.

34. (Currently Amended) The computer-readable medium of claim 19, wherein the ~~instructions for executing the tasks further comprise instructions for~~process further comprises:

updating a status corresponding to a task in the workflow; and

~~responsive to the updating,~~ evaluating the workflow to determine that a next task of the tasks to be implemented.

Type of Response: Amendment

Application Number: 09/995,004

Attorney Docket Number: MS1-772US/154742.01

Filing Date: November 26, 2001

35. (Cancelled)

36. (Currently Amended) The computer-readable medium of claim 19, wherein the tasks implement a policy with respect to one or more ~~directory resources~~ represented by objects in the directory, and ~~wherein the instructions for mapping the state change to the object the process~~ further comprises ~~instructions for automatically determining~~ identifying the workflow based on the policy.

37. (Currently Amended) A computing device configured to perform a process, the process comprising:

~~a memory comprising computer-executable instructions for dynamically implementing workflow responsive to a directory object state change; and~~

~~a processor coupled to the memory for executing the computer-executable instructions, the computer-executable instructions comprising instructions for:~~

~~detecting a state~~ state changes to an objects in a directory, the directory corresponding to a directory schema, the directory comprising a network-based directory service allowing devices on a network to store, modify, and lookup objects corresponding to resources; and ~~responsive to detecting the state change:~~

responding to detecting the state changes by mapping the state changes to the object to a workflows, the workflows comprising stored information defining respective pluralities of tasks and flow therebetween comprising a set of tasks, the mapping including determining which state changes correspond to which workflows, -evaluating the state change to the object based on a declarative condition stored as a text string on an object instance of a content class defined by the directory schema; and

Type of Response: Amendment

Application Number: 09/995,004

Attorney Docket Number: MS1-772US/154742.01

Filing Date: November 26, 2001

executing ~~the tasks~~ to which the state changes correspond, wherein the task executed for a state change is a task in a workflow that corresponds to the state change ~~to achieve a desired state in the directory.~~

38. (Currently Amended) The computing device of claim 37, wherein ~~the instructions for executing the tasks further comprise instructions for~~ the process further comprises storing the desired state.

39. (Currently Amended) The computing device of claim 37, wherein the ~~instructions for executing the tasks further comprises~~ instructions for continuously repeatedly executing an operation of a task of the tasks until ~~convergence of the~~ a desired state is identified.

40. (Currently Amended) The computing device of claim 37, wherein the ~~instructions for executing the tasks further comprises~~ instructions for storing a sequence of operations based on the tasks.

41. (Currently Amended) The computing device of claim 37, wherein ~~instructions for executing the tasks further comprises~~ instructions for storing information corresponding to one or more directory objects to which of the workflows applies.

42. (Currently Amended) The computing device of claim 37, wherein the ~~instructions for executing the tasks further comprises~~ instructions for storing status information based on respective status of at least one subset of the tasks.

Type of Response: Amendment

Application Number: 09/995,004

Attorney Docket Number: MS1-772US/154742.01

Filing Date: November 26, 2001

43. (Cancelled)

44. (Currently Amended) The computing device of claim 37, wherein a task of the tasks comprises any combination of one or more declarative conditions and one or more operations represented by a text string stored on an object instance ~~of a content class defined by the directory schema.~~

45. (Currently Amended) The computing device of claim 37, wherein semantics of the workflows are based on a workflow schema.

46. (Currently Amended) The computing device of claim 37, wherein ~~the instructions for mapping the state change to the object,~~ semantics of the mapping are based on an event association object schema.

47. (Currently Amended) The computing device of claim 37, wherein ~~the instructions for executing the tasks,~~ at least ~~one subset~~ some of the tasks in a workflow are executed with respect to one another based on an order of execution relationship comprising a finish-start relationship, a parallel execution relationship, a precedence constraint relationship, or a task priority relationship.

48. (Currently Amended) The computing device of claim 37, wherein ~~the instructions for executing the tasks,~~ at least ~~one subset~~ some of the tasks of one workflow are executed with respect to one another based on a precedence constraint relationship or a task priority relationship.

Type of Response: Amendment

Application Number: 09/995,004

Attorney Docket Number: MS1-772US/154742.01

Filing Date: November 26, 2001

49. (Currently Amended) The computing device of claim 37, wherein the ~~computer-executable instructions-process~~ further comprise instructions for:
- monitoring a status corresponding to a task of the tasks; and
 - storing the status on a status monitoring object; ~~and~~
 - ~~wherein a content class in the directory schema defines the status-monitoring object.~~
50. (Currently Amended) The computing device of claim 37, wherein the ~~computer-executable instructions-process~~ further comprises ~~instructions for~~:
- monitoring a set of directory resources affected by the workflow; and
 - storing the directory resources on a status monitoring object; ~~and~~
 - ~~wherein a content class in the directory schema defines the status-monitoring object.~~
51. (Currently Amended) The computing device of claim 37, wherein the ~~computer-executable instructions-process~~ further comprises ~~instructions for~~:
- monitoring a status corresponding to an operation of the workflow;
 - determining that the status comprises a failure status; and
 - responsive to the determining, taking a corrective action to advance the workflow in view of the failure status; ~~and~~
 - ~~wherein a content class in the directory schema defines the status-monitoring object.~~
52. (Currently Amended) The computing device of claim 37, wherein the ~~instructions for executing the tasks-process~~ further comprises ~~instructions for~~:
- updating a status corresponding to a task in one of the workflows; and

Type of Response: Amendment

Application Number: 09/995,004

Attorney Docket Number: MS1-772US/154742.01

Filing Date: November 26, 2001

responsive to the updating, evaluating the workflow to determine that a next task of the tasks needs to be implemented.

53. (Cancelled)

54. (Currently Amended) The computing device of claim 37, wherein the ~~tasks-process~~ implements a policy with respect to one or more directory resources, and wherein the ~~instructions for mapping the state changes to the objects~~ further comprises instructions for automatically determining the workflow based on the policy.

55-72. (Cancelled)

73. (Currently Amended) A computer-readable medium storing information comprising a workflow enabled directory schema for automated workflow implementation responsive to state changes to objects in a directory that corresponds to the directory schema, the directory comprising a network-based directory service allowing devices on a network to store, modify, and lookup objects corresponding to resources ~~by a set of computer program instructions executable by a processor~~, the workflow enable directory schema ~~comprising~~ defining a plurality of base object content classes comprising:

a ~~provisioning-service content~~ class to detect an event corresponding to a state change in a directory object;

a workflow content class for storing a sequence of tasks of a workflow and operational flow between the tasks;

an event association content class for storing declarative conditions to map the state

Type of Response: Amendment

Application Number: 09/995,004

Attorney Docket Number: MS1-772US/154742.01

Filing Date: November 26, 2001

change to the directory object to an a workflow object instance of the workflow content class;
and

wherein the ~~provisioning-service content~~ class is further configured to execute ~~the~~
~~sequence of tasks corresponding to~~ of the workflow object instance.

74. (Currently Amended) The computer-readable medium of claim 73, wherein ~~at least a~~
~~subset of the~~ the schema further defines a base object content class ~~classes~~ ~~comprise~~
~~comprising a respective~~ flexible attribute data field that indicates a data type, the data type
being used to express various operational or data providing properties of the flexible attribute,
the various operational or data providing properties being independent of the data type and
independent of any modification to the workflow enabled directory schema.

75. (Currently Amended) The computer-readable medium of claim 73, wherein the ~~sequence~~
~~of tasks comprises~~ comprise any combination ~~of a~~ of declarative conditions and operations
corresponding to directory-based objects.

76. (Currently Amended) The computer-readable medium of claim 73, the schema further
~~comprising defining~~ a status monitoring ~~content~~ class for storing a status of an object instance
of the workflow content class.

77. (Canceled)

78. (Previously Presented) A computer comprising the processor coupled to a memory
comprising the computer-readable medium of claim 73.